Modeling Climate Change

Variable Infiltration Capacity (VIC)
Macroscale Hydrologic Model

Variable Infiltration Capacity (VIC) Macroscale Hydrologic Model

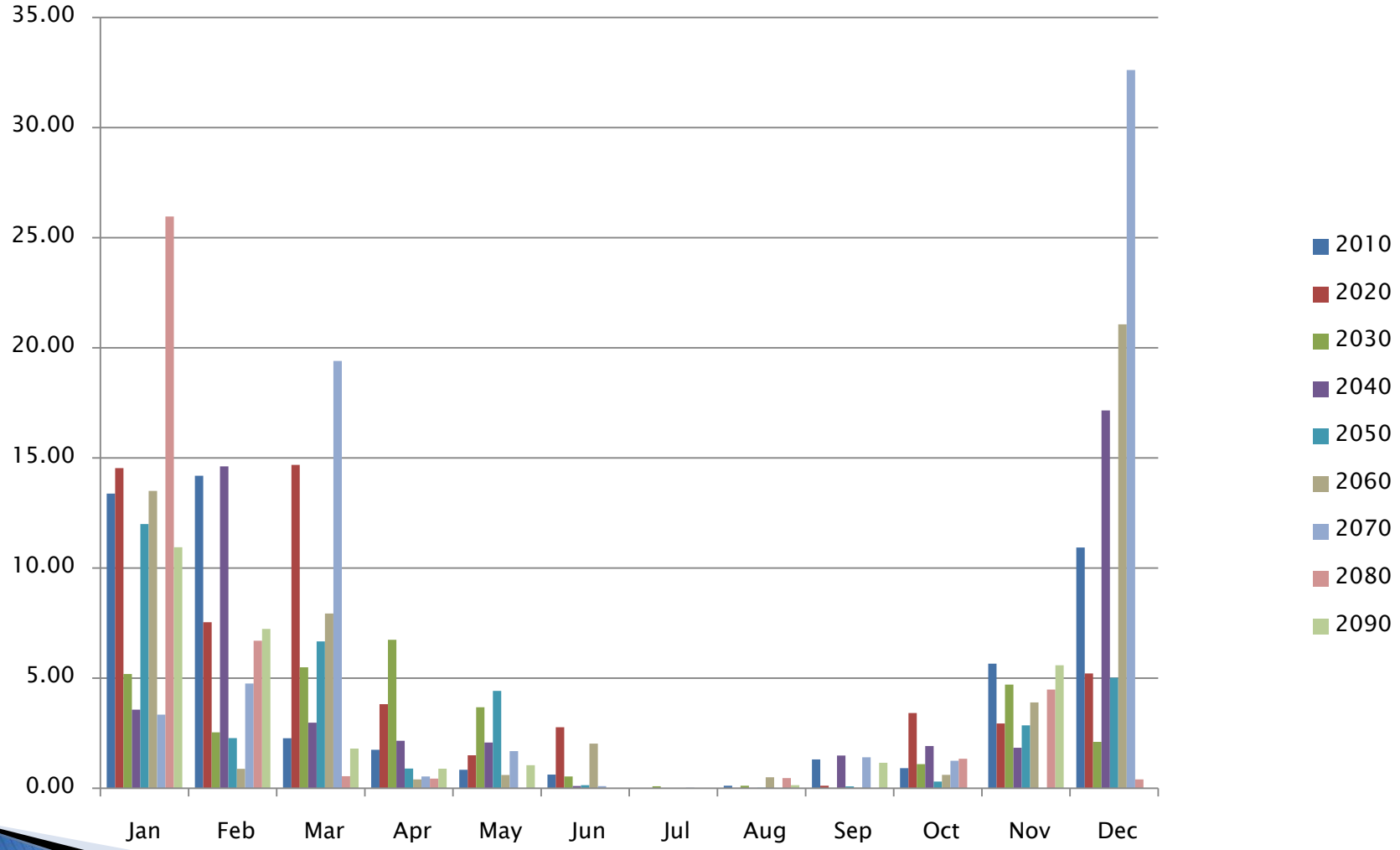
- VIC is a model that has been applied to many watersheds including the Columbia River, the Ohio River, the Arkansas-Red Rivers, and the Upper Mississippi Rivers, as well as being applied globally.
- Measures in 1/8 degree resolution
- Information for every month from 1950-2099
- Approved by the State of California

Components

1950-2099

- Year
- Month
- Precipitation (mm/day)
- Actual evapotranspiration (mm/day)
- Runoff (mm/day)
- Baseflow (mm/day)
- Air temperature (deg C)
- Soil moisture at top layer (mm)
- Soil moisture at middle layer (mm)
- Soil moisture at bottom layer (mm)
- Net radiation at the surface, includes long and shortwave (W/m2)
- Relative humidity (%)
- Snow water equivalence (mm)
- 10m wind speed (m/s)
- Fractional moisture in the entire soil column (fraction) (of porosity, 1=saturation)

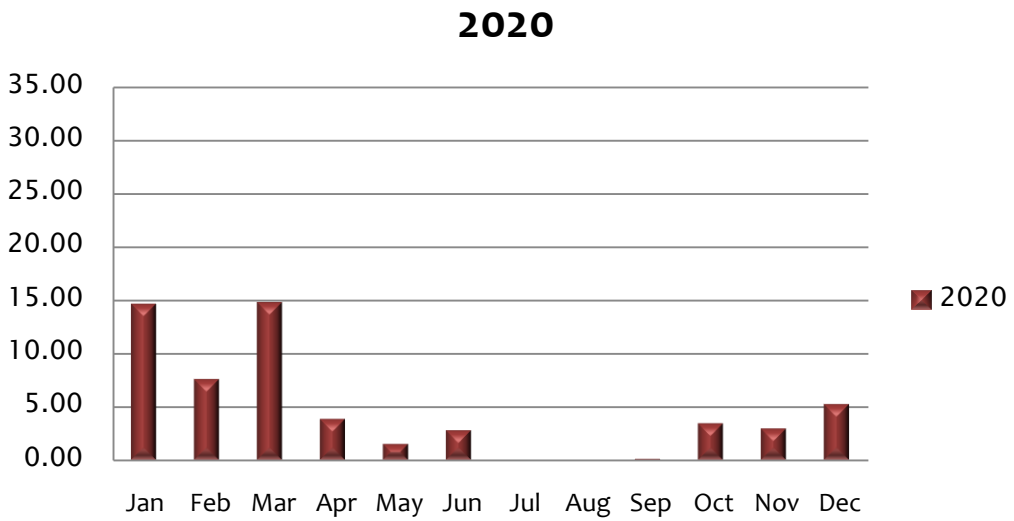
Precipitation mm/day



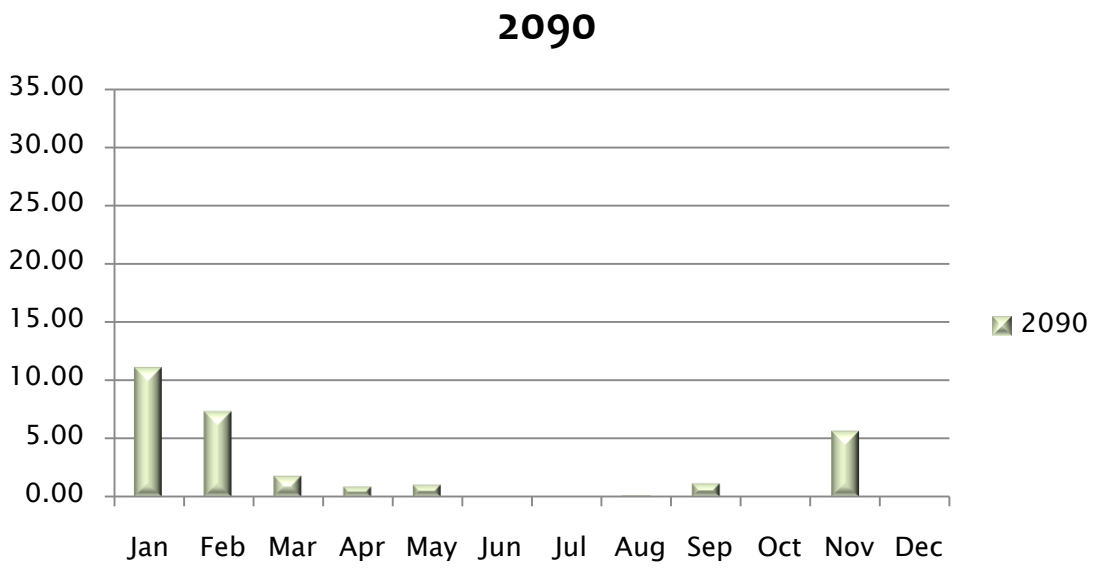
So What Does it Say?

Month	2010	2020	2030	2040	2050	2060	2070	2080	2090
1	13.38	14.54	5.19	3.57	11.99	13.50	3.34	25.96	10.95
2	14.19	7.54	2.54	14.62	2.28	0.88	4.76	6.70	7.24
3	2.27	14.68	5.49	2.98	6.67	7.93	19.40	0.55	1.80
4	1.75	3.82	6.74	2.16	0.89	0.40	0.54	0.44	0.89
5	0.84	1.50	3.68	2.07	4.42	0.60	1.68	0.00	1.05
6	0.62	2.77	0.54	0.10	0.14	2.03	0.10	0.01	0.01
7	0.01	0.01	0.09	0.00	0.01	0.00	0.03	0.00	0.00
8	0.11	0.02	0.12	0.02	0.02	0.50	0.01	0.46	0.14
9	1.31	0.12	0.01	1.48	0.09	0.02	1.41	0.01	1.16
10	0.91	3.42	1.10	1.92	0.30	0.61	1.25	1.34	0.00
11	5.66	2.94	4.70	1.84	2.86	3.90	0.00	4.48	5.58
12	10.93	5.21	2.11	17.15	5.02	21.07	32.61	0.40	0.00

2070 has by far the most amount of precipitation, at an average of 5.43 mm/day. However, the precipitation in this year is not spread out through the months, it has two high peak months and very little amount for the rest of the months. 2080 also has high peak months. The highest peak month is December 2070, at 32.61. 2090 is the least amount of precipitation, at an average of 2.40 mm/day. The high precipitation months are generally in January and February , with little precipitation in November .



In the year of 2020, the average precipitation is 4.71 mm/day. January and March are the wettest months. The amount of precipitation in the months of November and December were reduced by over half compared to the previous chart, 2010. However, during the overall year, 2020 is the second wettest year of 2010-2090. The amount of precipitation is somewhat spread out throughout the year. The months of April through December are dry and are all under the amount of 5 mm/day . There is no precipitation during the months of July through September.



In the year of 2090, the average amount of precipitation is 2.40 mm/day. This is by far the driest year between 2010-2090. The only months that there is a significant amount of precipitation is Jan, February and November. All other months have little or no precipitation.

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Cayan, D., M. Tyree, M. Dettinger, H. Hidalgo, T. Das, E. Maurer, P. Bromirski, N. Graham and R. Flick, 2009: Climate Change Scenarios and Sea Level Rise Estimates for the California 2009 Climate Change Scenarios Assessment. California Climate Change Center, publication #CEC-500-2009-014-F, 64 pages, August 2009